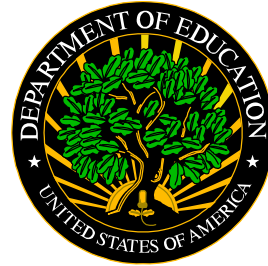*SFA Modernization Partner*

United States Department of Education
Student Financial Assistance

Data Mart Integration Framework, 2001

Task Order 71
Deliverable 71.1.2

November 30, 2001

Contents

Introduction

SFA has several data marts in operation and development:

- The Chief Financial Office (CFO) data mart
- The Financial Partners (FP) data mart
- The Delinquent Loans (DL) data mart
- The Credit Management (CM) data mart.

With more data marts planned over FY02 and FY03 (e.g. NSLDS, FP Mart II & III), it is important to establish standards to enable data sharing and to streamline data mart development.

This project was approved by the Investment Review Board to develop those standards, which are presented here. The standards are referred to as the "Data Mart Integration Framework, 2001." It is expected that the Framework will be maintained by the Architecture Working Group, and will be actively used by new data mart developers. Existing data marts may choose to utilize the Framework if there are compelling business reasons.

We've also recommended a maintenance and review process for ensuring that the Framework will continue to meet enterprise data mart integration needs, as well as ensuring that the data mart teams adhere to, and/or help improve the Framework.

Framework Development Process
The Framework was developed using existing data mart designs and by collaborating with the data mart teams. The following diagram shows the major steps in the development process:
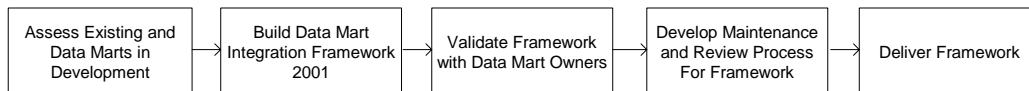
Beyond this project, the Data Architecture team should be consulted for consistency in format and naming conventions.

Data Mart Integration Framework, 2001

The Framework consists of standardized "dimensions" and the recommended maintenance and review processes. See below for a list of standardized dimensions. Dimensions enable grouping, categorization and aggregation of performance metrics in data marts.

Standard Dimensions	CFO Data Mart	FP Data Mart	DL Data Mart	CM Data Mart	New
School			X	X	
Borrower			X	X	
Loan Type		X	X	X	
Lender		X			
Guaranty Agency		X			
Fund	X				
Date	X	X	X	X	
Address		X	X	X	
Grant					X
Servicer					X

The above matrix shows that some of the standards (i.e. school, borrower) are currently used in more than one data mart. These dimensions, while sharing some common elements, are structured differently, hence the need for standardization.

Within the borrower dimension, for example, the DL mart captures the borrower's middle initial information. The CM mart does not currently capture borrower middle initial information, but does capture email information and zip + 4 descriptions which the DL mart does not. The CM mart and the DL mart both capture social security information for a borrower, but within the CM mart it is used as the unique identifier for a borrower record, and just as a regular attribute within the DL mart, which uses a borrower ID as the unique identifier for a borrower record.

This section shows the recommended attributes in each of the above 10 dimensions.

The School Dimension

Attribute Name	Attribute Description
School Id	Unique identifier for the school
School Address Id	School address identifier, used to link up to address dimension table to retrieve school address information
School Congressional District ID	The congressional district for a school
School Short Name	The short name description of a school
School Long Name	The long name description of a school
School Code Desc	The school code description
School Wan Inst Name	Wan instance name for a school
School Wan Participation Year	Wan participation year for a school
School Wan Title4 Address	Wan title IV address for a school
School Wan Cycle	Wan cycle for a school
School Wan Format Code	Wan format code for a school
School Wan Switch	Wan switch for a school
School Dun Number	Dun Number for a school
School Control Desc	Control description for a school (public, private, foreign, etc.)
School Ethnic Type Desc	Ethnic type description for a school (native american, hispanic, historically black, etc.)
School Type Desc	School type description (two year school, four year school, etc.)

Some possible drilldown/rollup paths for the school dimension are depicted below:
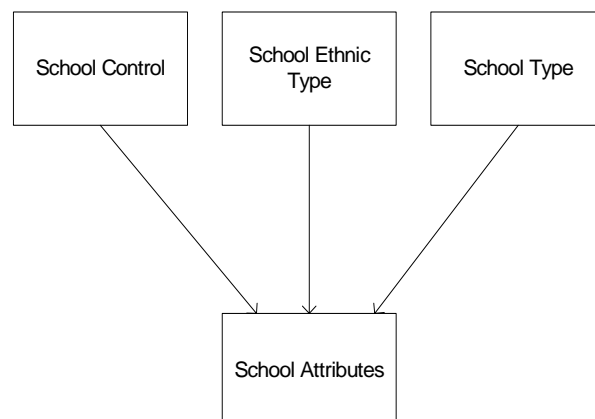
The Borrower Dimension

Attribute Name	Attribute Description
Borrower Id	Unique identifier for a borrower
Borrower Address Id	Borrower address identifier, used to link up to address dimension table to retrieve borrower address information
Borrower Congressional District ID	The congressional district for a borrower
Borrower Social Security Number	Social Security number of a borrower
Borrower First Name	The first name of a borrower
Borrower Middle Initial	The middle initial of a borrower
Borrower Last Name	The last name of a borrower
Borrower Birth Date	The birth date of a borrower
Borrower Home Phone Number	The home phone number for a borrower
Borrower Home Phone Number Condition Flag	A condition flag indicating whether a home phone number is valid or not for a borrower
Borrower Email Address	The email address of a borrower
Borrower Email Address Condition Flag	A condition flag indicating whether an email address is valid or not for a borrower
Borrower Business Phone Number	The business phone number of a borrower
Borrower Business Phone Number Condition Flag	A condition flag indicating whether a business phone number is valid or not for a borrower

The Loan Type Dimension
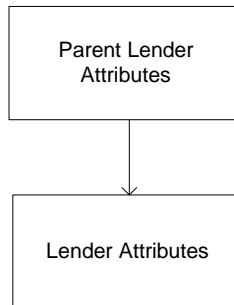
Attribute Name	Attribute Description
Loan Type Id	Unique identifier for a specific type of loan
Loan Type Acrnym	The acronym for a specific type of loan
Loan Type Desc	The description of a specific loan type

The Lender Dimension

Attribute Name	Attribute Description
Lender	Unique identifier for a specific lender
Lender Address Id	Lender address identifier, used to link up to address dimension table to retrieve lender address information
Lender Name	The name of a specific lender
Lender Active Flag	A flag indicating whether a lender is active or not
Lender Parent Lender Id	Unique identifier for a lender's parent lender
Lender Parent Lender Name	The name of a lender's parent lender

Some possible drilldown/rollup paths for the lender dimension are depicted below:
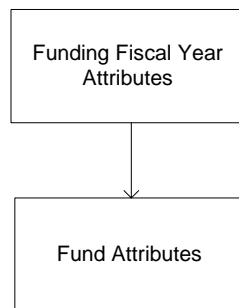
```
┌─────────────────┐
│  Parent Lender  │
│   Attributes    │
└─────────────────┘
         │
         ▼
┌─────────────────┐
│                 │
│ Lender Attributes │
│                 │
└─────────────────┘
```

The Guaranty Agency Dimension

Attribute Name	Attribute Description
GA Id	Unique identifier for a specific guaranty agency
GA Address Id	Guaranty agency address identifier, used to link up to address dimension table to retrieve guaranty agency address information
GA Name	The name of a specific guaranty agency
GA Contact Name	The contact name for a guaranty agency
GA Contact Phone Number	The contact phone number for a guaranty agency
GA Active Flag	A flag indicating whether a guaranty agency is active or not
GA Revised Agency Name	The revised agency name for a guaranty agency

The Fund Dimension

Attribute Name	Attribute Description
Fund Id	Unique identifier for a specific fund
Fund Desc	The description for a specific fund
Fund FY Id	Identifier for a funding fiscal year
Fund FY Desc	The funding fiscal year description

Some possible drilldown/rollup paths for the fund dimension are depicted below:

```
┌──────────────────────┐
│ Funding Fiscal Year  │
│    Attributes        │
└──────────────────────┘
            │
            ▼
┌──────────────────────┐
│   Fund Attributes    │
│                      │
└──────────────────────┘
```

The Date Dimension

Attribute Name	Attribute Description
Date Id	The specific date that an activity took place
Date Desc	The description of the specific date that an activity took place
Calendar Week Id	The identifier of the calendar week associated with a specific date; week ending date is always a Saturday.
Calendar Week Desc	The description of the calendar week associated with a specific date
Calendar Month Id	The identifier of the calendar month associated with a specific date
Calendar Month Short Desc	The short description of the calendar month
Calendar Month Long Desc	The long description of the calendar month
Calendar Quarter Id	The identifier of the calendar quarter associated with a specific date; a grouping of 3 calendar months
Calendar Quarter Short Desc	The short description of the calendar quarter
Calendar Quarter Long Desc	The long description of the calendar quarter
Calendar Year Id	The calendar year
Fiscal Week Id	The identifier of the fiscal week (based on the financial calendar) associated with a specific date; week ending date is always a Saturday
Fiscal Week Desc	The description of the fiscal week associated with a specific date
Fiscal Month Id	The identifier of the fiscal month associated with a specific date
Fiscal Month Short Desc	The short description of the fiscal month
Fiscal Month Long Desc	The long description of the fiscal month
Fiscal Quarter Id	The identifier of the fiscal quarter associated with a specific date; a grouping of 3 fiscal months
Fiscal Quarter Short Desc	The short description of the fiscal quarter
Fiscal Quarter Long Desc	The long description of the fiscal quarter
Fiscal Year Id	The fiscal year; grouping of 52 fiscal weeks / 12 months that comprise the fiscal year

Some possible drilldown/rollup paths for the date dimension are depicted below:

```
┌─────────────┐        ┌─────────────┐
│ Fiscal Year │        │ CalendarYear│
└──────┬──────┘        └──────┬──────┘
       │                      │
       ▼                      ▼
┌─────────────┐        ┌──────────────┐
│Fiscal Quarter│        │CalendarQuarter│
└──────┬──────┘        └──────┬───────┘
       │                      │
       ▼                      ▼
┌─────────────┐        ┌──────────────┐
│ Fiscal Month│        │ CalendarMonth│
└──────┬──────┘        └──────┬───────┘
       │                      │
       │                      │
┌─────────────┐        ┌──────────────┐
│ Fiscal Week │        │ CalendarWeek │
└──────┬──────┘        └──────┬───────┘
        \                    /
         \                  /
          ▼                ▼
         ┌──────────────────┐
         │       Date       │
         └──────────────────┘
```
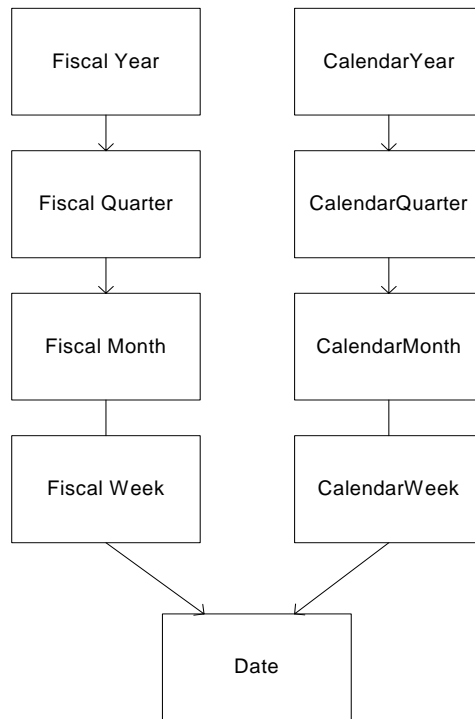
Key Recommendation:
The "date" dimension should contain all addresses on the same physical data structure, regardless of the date that is being stored. The view of delinquent date, for example, would be a function of the data mart's query feature.

The Address Dimension

Attribute Name	Attribute Description
Address Id	Unique identifier for a specific address location
Address Street Address Line 1	Line 1 of the street address for a specific address location
Address Street Address Line 2	Line 2 of the street address for a specific address location
Address City Id	The identifier for a specific city where an address is located
Address City Desc	The name of the city where a specific address is located
Address State Code	The state code of the state where a specific address is located
Address State Desc	The name of the state where a specific address is located
Address Zip Code	The 5 digit zip code for a specific address location
Address Zip Code Plus 4	The full 9 digit zip code for a specific address location
Address Region Id	The identifier for a specific region associated with an address location
Address Region Desc	The name of the region associated with an address location
Address Condition Flag	A condition flag indicating whether an address is valid or not
Address Foreign Address Flag	A flag indicating whether an address is within the United States or if it is a foreign address

Some possible drilldown/rollup paths for the address dimension are depicted below:
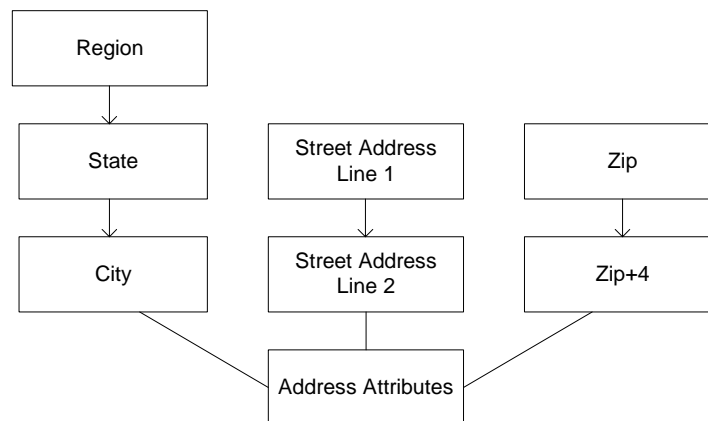
Key Recommendation:
The "address" dimension should contain all addresses on the same physical data structure, regardless of the address that is being stored. The view of GA address, for example, would be a function of the data mart's query feature.

The Grant Dimension

Attribute Name	Attribute Description
Grant Id	Unique identifier for a specific grant
Grant Desc	The description of a specific grant

The Servicer Dimension

Attribute Name	Attribute Description
Servicer Id	Unique identifier for a specific servicer
Servicer Address Id	Servicer address identifier, used to link up to address dimension table to retrieve servicer address information
Servicer Name	The name of a specific servicer

While one key activity of the framework was to standardize the above dimensions, we have presented additional recommendations for specific usage of the date and address dimensions.

Recommended Framework Maintenance and Review Process

Equally important as the enterprise standards is the framework maintenance and review process to ensure proper usage, maintenance, and adherence of the framework. The framework is a living entity, and will be updated and enhanced based on new business requirements and increased input from data mart architects. As the first iteration of the framework, the Data Mart Integration Framework, 2001 will see its value grow over time. The following flow diagram is from a data mart architecture perspective and illustrates the process components of the maintenance and review model for the Data Mart Integration Framework, 2001:
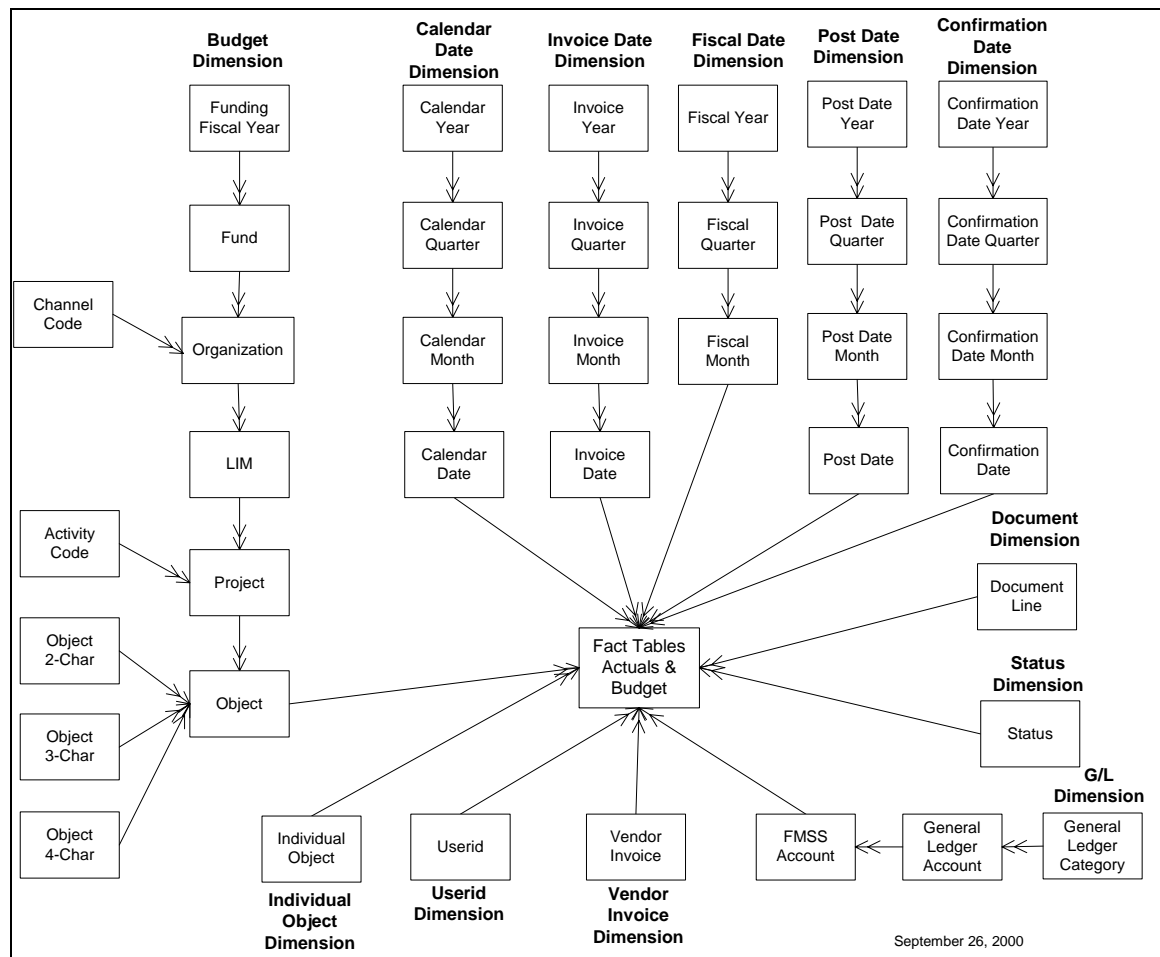
DATA MARTS:
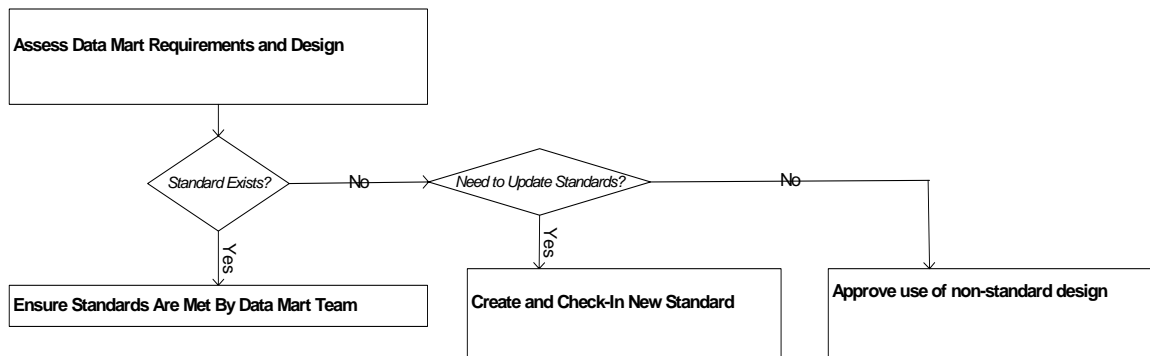
The Architecture Working Group, in conjunction with SFA CIO Data Warehouse Architecture, should oversee maintenance of the framework. Responsibilities of maintaining and reviewing the framework include:

- Ensuring data mart owners are aware of the data mart integration framework and how to use it
- Approving new standard dimensions for inclusion into the framework based on a valid business case
- Approving updates and changes to existing framework based on a valid business case
- Approving exemptions from framework compliance based on a valid business case
- Oversight of a single standard dimension repository staging area which all data marts must 'check-out' the standards from to ensure conformity across data marts
- Ensuring consistent naming conventions for standards
- Ensuring consistent data value definitions for standards
- Ensuring consistent data types for standards

The CFO Data Mart

The CFO mart provides an automated financial analysis and reporting process
for the CFO. Information in the data mart is focused on budgeting, expense
reporting and forecasting. By providing users with an automated and flexible
view of financial data from FMSS (Dept. of Ed's Financial System), the CFO mart
eliminated an otherwise manual reporting process.

For specific technical information, please refer to the CFO Data Mart design
documents.   Below is the CFO logical data model:

CFO Data Mart Logical Model

The Financial Partners Data Mart

The FP mart holds centralized information associated with student lending among Financial Partners (guaranty agencies, lenders, and servicers). This information is used within the Financial Partners channel to help risk management, customer relationship management, compliance management, and portfolio management. The current release of the financial partners data mart focuses on guaranty agency and lender information. Servicing information will be included in a future enhancement release of the financial partners data mart.

The FFEL system was used to populate FP's database. To satisfy some user requirements, lender associations and some Form 1130 annual data that do not exist in the FFEL system are also placed into the data mart.

For specific technical information, please refer to the FP Data Mart design documents. Below is the FP logical data model:
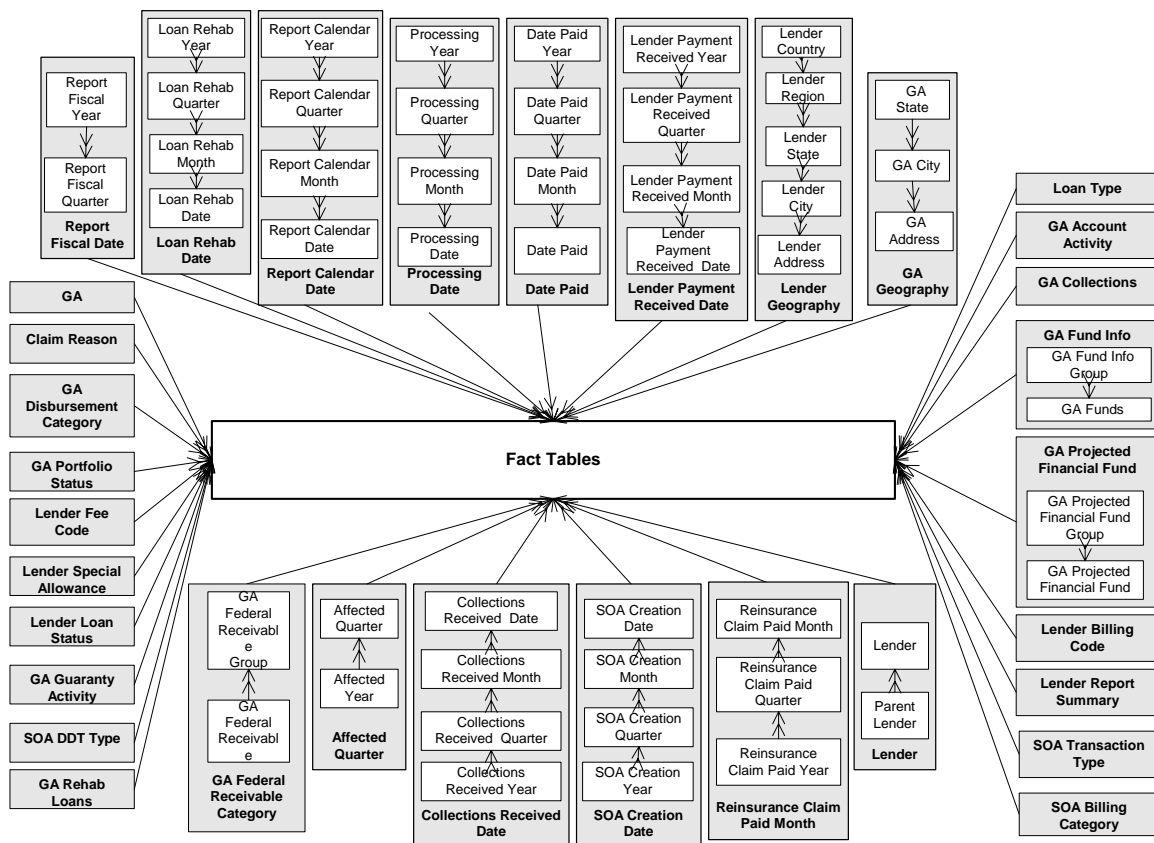

Financial Partners Data Mart Logical Model

The Delinquent Loans Data Mart

The DL mart provides delinquent loans reporting to schools and SFA. This capability was transferred from the tomb-stoned CDS system. The DL mart, unlike the old CDS delinquency reports, maintains historical data and can be used for trend analysis by student, student groups, schools, etc.

The mart generates two reports – one for SFA use, categorized by school and student, and the other for schools with student delinquencies for that school (note that the same report has two formats).

For specific technical information, please refer to the DL Data Mart design documents.   Below is the DL logical data model:
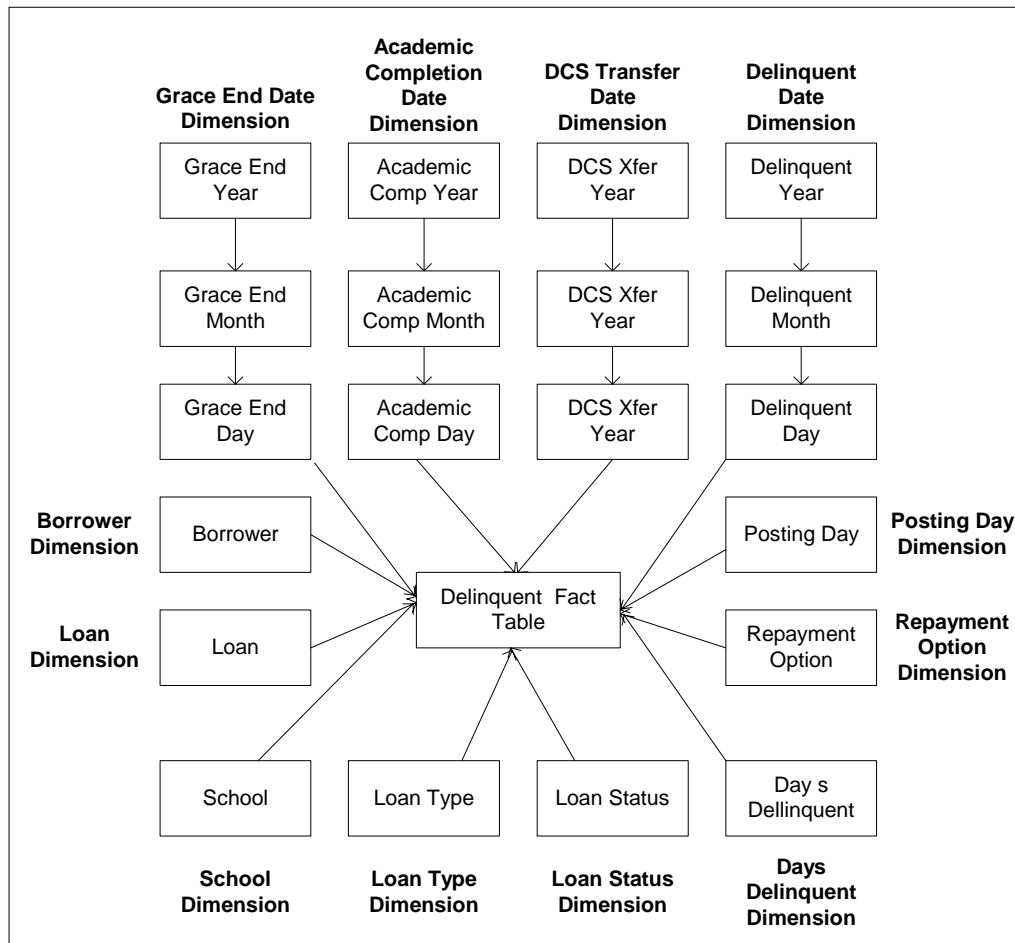
Delinquent Loans Data Mart Logical Model

Data Mart Architecture Overview

These existing data marts (CFO, FP, DL) use the same enterprise infrastructure in production, including Informatica for data acquisition, Oracle for database, and Microstrategy for analytic reporting. The following diagram presents a snapshot view of the infrastructure for these data marts:

Current Data Mart Production Infrastructure
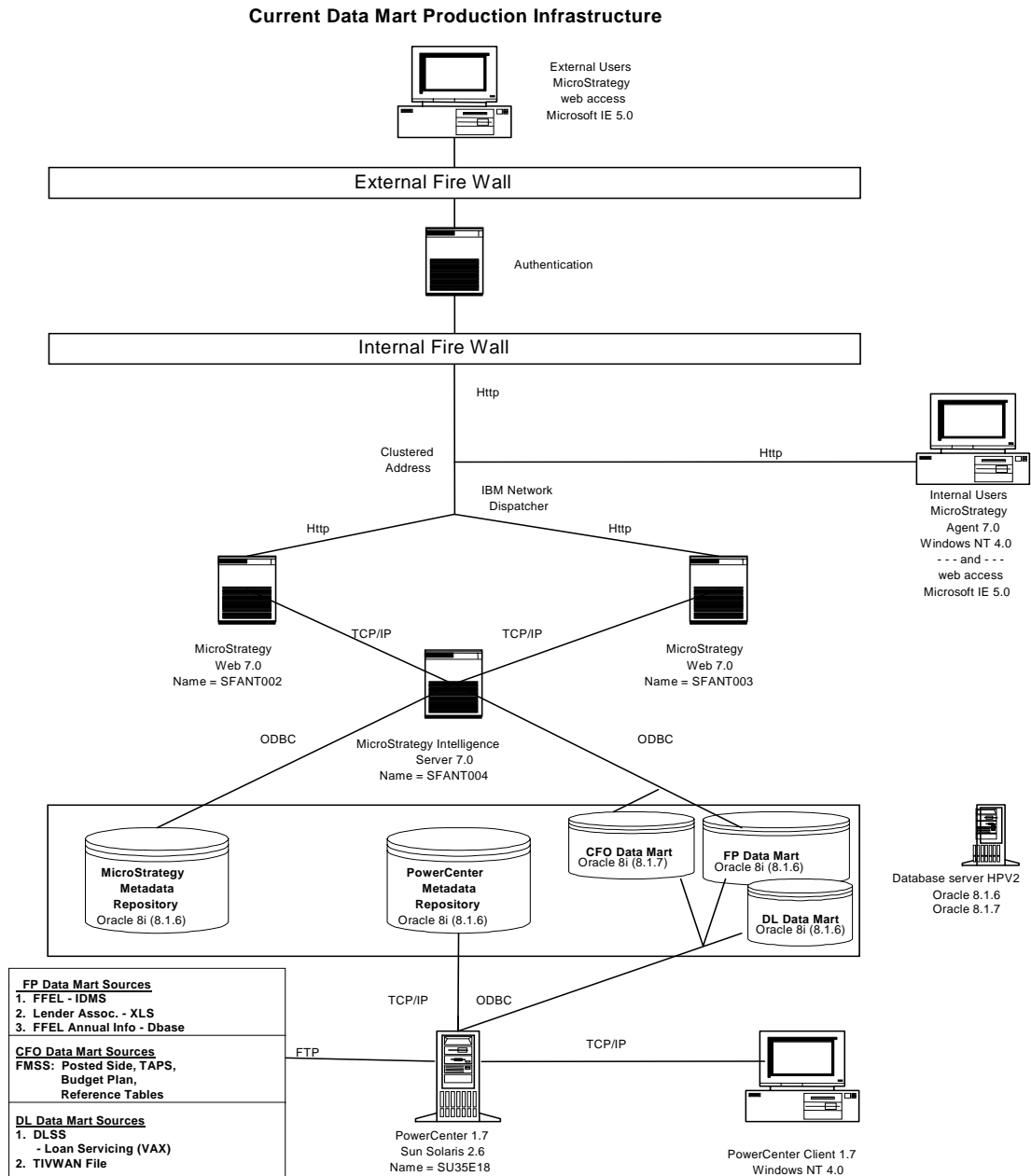
Key Contacts

For more information on the content discussed in this deliverable, please contact
the appropriate subject matter experts below:

Subject Matter	Contact Person	Email Address	Phone Number
Data Mart Integration Framework, 2001	Shyam Pai Jim Greene	shyam.b.pai@accenture.com james.greene@ed.gov	202-962-0843 202-377-3560
CFO Data Mart	Shyam Pai Jim Greene Russell Young	shyam.b.pai@accenture.com james.greene@ed.gov russell.young@ed.gov	202-962-0843 202-377-3560
FP Data Mart	Nancy Krecklow	nancy.a.krecklow@accenture.com	202-962-0637
DL Data Mart	Dave Brady	dave.brady@acs-inc.com	301-721-3374
CM Data Mart	Gray Griffith	mary-gray.griffith@accenture.com	202-962-3702